

formed under the steps and risers, are filled in over the laths with stone rubble, packed up so as to rest upon and be supported by the laths. Mortar is then forced up from below into the rubble, and made to pass through and incorporate the rubble into a concrete mass, and so as to extend over the laths which carry it, and produce as neat a surface as if the plaster were merely held up by keys through slight laths, as with us; whilst the result in the one case is an almost incombustible structure, and in the other an easily inflamed and rapidly inflammable piece of hollow woodwork.

An ordinary plastered ceiling resists the action of fire for a long time; by a slightly increased expenditure it might be made to afford an effectual bar. The French (the carpenters and joiners there, we may as well say at once, are much inferior in skill to ours) make their floors as nearly fireproof as can be desired.

"According to their practice, the ceiling must be formed before the upper surface or floor is laid, inasmuch as the ceiling is formed from above, instead of from below.—The carpenters' work being complete, strong batten-laths are nailed up to the under sides of the joists, as laths are with us; but they are much thicker and wider than our laths, and are placed so far apart, that not more, perhaps, than one-half of the space is occupied by the laths. The laths being affixed—and they must be soundly nailed, as they have a heavy weight to carry—a platform, made of rough boards, is struttled up from below parallel to the plane formed by the laths, and at about an inch below them. Mortar is then laid in from above over the platform, and between and over the laths, to a thickness of from two inches and a half to three inches, and is forced in under the laths, and under the joists and girders. The mortar being gauged, as our plasterers term it, or rather, in great part composed of plaster of Paris, it soon sets sufficiently to allow the platform—which it will be readily understood, has performed the same office to the mortar which centering performs to the parts of an arch or vault—to be removed onwards to another compartment, until the whole ceiling of any room or story of a building is formed. The plaster ceiling thus formed, is, in fact, a strong slab or table, in the body of which the batten-laths which hold it up safely in the air are incorporated, and in the back of which the joists, from which the mass is suspended, are embedded."

The flooring joists are also covered with a table of plaster above, about three inches thick, laid on rough battens in short lengths, and which is afterwards covered with either paving tiles or a boarded floor.\*

Throughout the work, it will be seen, much valuable information in respect of construction is given, and of the evils attendant on bad practices. Some of the remarks to this effect we quoted on a previous occasion, and many of the latter have been continuously exposed in THE BUILDER. The common custom in all large towns, of omitting or removing the outer walls throughout the ground-floor story,

on two sides of corner houses, to admit of returned shop-fronts—a practice so full of danger as to condemn itself the moment it is reflected on—is properly condemned:—

"Commonly a doorway is made upon a canted or diagonal line cutting off the corner where two fronts intersect, and leaving the quoin or outer angle of the building above to overhang a void; whilst the support given to the breastsummers placed under the walls of the upper stories is generally either slight fir story-posts, or even slighter iron columns, and which supports are not unfrequently placed over openings in the walls below, and almost always over timber in some form or other, in situations and under circumstances most liable to induce decay. Plastering and joiner's fittings cover up the parts upon the soundness of which so much is made to depend, and, consequently, danger will hardly appear unless accident develop it in such manner as to attract attention in time to avert it, until the wretched fabric falls upon the heads of the indwellers, and of those persons who may be otherwise within reach of the ruin."

To the use of bearing-beams and girders of cast-iron our author, of course, also objects, as being fraught with danger; and he advocates very strongly the employment of floors upon girders, or framed to strong trimmers, the girders on the trimmer-joists running into and bearing upon the piers or solids of the walls, as being far preferable to single floors, of which every joist runs for itself into the walls.

"Girders, as the basis of, or to carry, floors, render plates in the walls wholly unnecessary, by depositing the weight in the right places, without requiring plates to carry it on from the weaker to the stronger places; and being of necessity stout and rigid, they form a fair tie and strut to the walls into which their bearing ends are tailed, and upon which they rest. Moreover, girders, being of infrequent recurrence, may be allowed to tail into party-walls without injuring their efficiency as a means of stopping fire, and so buildings of several stories may be rendered stiffer, or less liable to be acted upon by movements upon the floors within them, than when all the floors bear upon the same walls, and these the walls which are too commonly the most infirm."

The single or unframed floors carry the weight and vibration to which they are exposed into the walls, over voids as well as over solids, while by means of girders the floors may be brought to bear upon the solids only. The following paragraph embraces, suggestively, several other points as well as this:—

"An arch over an opening in a wall, or a common vault pressing against a wall, may tend to render insecure a structure in other respects fully adequate to its purposes of enclosing or of dividing buildings, and of bearing the greatest direct vertical pressure that can at any time be brought to bear upon it. The timbers of floors may be laid in, or be let into, walls, so as to expose the walls to serious injury, and to lead to danger; and roofs may be so composed and placed upon the walls of buildings as to thrust them out. Cantilevers acting as levers, and cornices only prevented from falling by otherwise superfluous parapets, and many other things, some of which pass under the name of architectural decorations, tend either to lessen the stability of walls, or to impose the necessity of greater substance in their structure than would be necessary if such things, when applied, were applied with structural propriety."

In lieu of iron columns or story posts to carry a fire-proof floor, brick piers, for safety-sake, should be used. A two-brick pier, says our author, well built of pavours, or Dutch clinkers, set in a well-compounded mortar, will carry safely almost any weight that can be imposed upon it.

"An excellent mortar for resisting the action of fire, and proper to be employed in building any such slight brick piers as substitutes for, or instead of employing, iron

columns, may be made of pozzolano mixed with fresh-ground lime of chalk from the lower beds; and as real pozzolano is an imported substance, and likely to be expensive, its place may be very well supplied by an artificial substance of similar character, produced by burning any marly clay that is fit for brick-making to a grey clinker, and reducing such clinker to a grain of the size of coarse sand. Three-fourths of this substance to one-fourth of fresh-ground lime, mixed dry in the first instance, and when so mixed, rendered plastic by the addition of soft water, will yield a mortar capable of resisting fire for a long time, and water, if need be, as long as any bricks that can be set in it."

We must pass on to the chapter on Drainage, which shows that Mr. Hosking has a just appreciation of the deadly effects of decomposing soilage retained in ill-constructed drains, still questioned, with unaccountable blindness, by some otherwise sensible men. Amongst other matter, our author points out the injury done to visitors at watering-places by the discharge of the town drainage upon the much-frequented sea-beach.

"Cast-iron mains are commonly used at these places to conduct the soilage from the sewers and drains a little way out from the land, and these are commonly allowed to terminate at half-tide level or thereabouts, so that they are for half their time discharging noise and pestilential streams under the nostrils of those who betake themselves to the beach for air and exercise. But ladies, with books or with needlework, and ndrses with their charges, are apt to resort to the propped up and clean-looking round iron pipes for the convenience they offer as seats; and as they sit, they, and the children who play about them, inhale the poisonous gases which the soilage of the town emits, and many a family returns inland from the sea-side fevered with the stench at the sea-beach, rather than invigorated by the sea-breezes."

The illness of all his own children, on one occasion, was thus caused.

He agrees with those who say that house-drains and sewers seldom require to be of the large sizes of which they are usually made, without going so far as some:—

"All soilage drains should be made watertight, that the liquid parts of the soilage may not escape into the subsoil, and leave the solid matters in the drain; and in using drains of small size, as soil drains, to dwellings, care must be taken to protect them from the access of any substance capable of resisting the available current of water. With care in this respect there are very few ordinary dwellings, houses, in towns, of which the soil and water drainage will not find ample room to pass along in a tube equal in capacity to a cylinder of 6 inches in diameter."

This being the case, we may reasonably hope that the amended Buildings Act will not as now preposterously enforce that drains shall have a diameter of not less than nine inches; the absurdity of which we have on various occasions pointed out.\*

As to the size of common sewers, Mr. Hosking still thinks that where they pass under roads which are considerable thoroughfares, they ought to be built large enough for workmen to pass into them to clear obstruction, and to effect repairs; with access from above-ground at bye-places provided for the purpose in laying out the scheme, so that the roads and streets be not at any time unnecessarily deranged for any such purposes."

In a postscript to the work, to get to which we pass for a time the chapter on the "Ventilation of Buildings,"—our author raises his voice strongly (with more emphasis, indeed, than elsewhere in the book), against the recommendation contained in the recent report of the Sanitary Commission, to cleanse the sewers

\* A similar enactment in respect of flues must also be altered in the new Act.

\* At Nottingham, in the neighbourhood of Clarendon Forest, where gypsum abounds, the floors of all houses were, till of late years, universally formed by an almost exactly similar process to that employed at Paris—about reeds, however, being strewn over the joints as a basis, instead of split battens. The practice at Nottingham adds small coal and cinders to the plaster of Paris gypsum, in making the mortar, and the surface is at once trowelled over to finish. In this manner is produced an almost indestructible floor, capable of any surface, and so secure a protection against fire, through its imperviousness to air, that, notwithstanding the unceded and exposed joints below, houses in Nottingham are said never to be burnt, whilst the floors are said to be free alike from damp and from vermin.

It may be worth remark here, having reference to the employment of any substance such as emder, being of the nature of pozzolano, or volcanic scoria, in mortars, to form a floor in the manner and of the substance above described (about three inches thick), that as all such mortars expand in setting, the walls of buildings may be forced out, and even thrown down, by the expansion of the plaster floors, if the face of the floor in any story be at once covered with mortar. A margin on every side of four or five inches, according to the use of the floor, should be left void of expansion of the body has taken place, when the floor is completed with an assurance of close joints, and injury to reasonably stable walls.